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PATENT SPECIFICATION

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COMPLETE SPECIFICATION

Improved Means for Transporting or Distributing Concrete or the like

WE, COMPAGNIE PARISIENNE D'OUTILLAGE A AIR COMPRIMÉ of 11⁴⁴, Rue Roquépine, Paris-8^e, France, a French body corporate, do hereby declare the nature of this invention 5 and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

The present invention relates to pneumatic 10 conveyors for concrete and like material.

In a known device of this kind, it has been proposed to use an open hopper the lower part of which is connected to a small receptacle. A non return flap valve is provided 15 between hopper and receptacle. In this receptacle abuts a pipe carrying compressed air and at its bottom part said receptacle receives another stream of air or water adapted to expel the material contained 20 therein through another valve. In this apparatus, the main mass of material lays open on the air and the danger exists that it will not be propelled towards and in said receptacle. Such danger arises especially 25 when dealing with concrete or the like.

In a still other apparatus intended for the transport of pulverised material, use is made of a transport tank comprising inside an open ended air duct with a split partition. A screw 30 stirrer is located inside said tank, in order to avoid any clogging of the material. A discharge pipe is situated on the lateral wall of the tank. This apparatus could hardly be used for clogging materials. On the other hand, 35 it is indispensable to have mechanical means for avoiding clogging effects. Furthermore, the air duct inside the tank risks to be clogged. Finally, the lateral situation of the discharge pipe prevents any thorough discharge action.

40 It has been proposed in the case of an apparatus intended for the introduction of solid particles into a steam or air-delivery line to have three chambers arranged vertically in line and communicating centrally 45 by main valves, the upper chamber constituting a hopper working at atmospheric pressure, the lower chamber a high pressure chamber under constant pressure supply, and the middle chamber one operating at one time

at atmospheric pressure, and at another time 50 at the same high pressure as the lower chamber, the solid particles passing from the upper hopper to the middle chamber while both are at atmospheric pressure, and passing from the middle chamber to the lower cham- 55 ber while both these chambers are under pressure higher than atmospheric (during which time the upper chamber or hopper is closed to the middle chamber), and finally passing into a delivery pipe line into which 60 a pressure fluid supply is arranged parallel to said pipe line and the particle flow.

In other known devices employed for handling coal, use has been made of an air pipe having a place where the handled 65 material may collect. Air is blown in this pipe and, at the beginning of this operation, the air volume and its velocity are insufficient to carry the material beyond the place of collection. When the collection is big enough 70 to close the pipe, a sufficient air pressure is supplied to free the pipe.

In still other older devices of this type, it has been proposed to have a bunker followed by and connected to a hopper. A valve is 75 located between hopper and bunker and the bottom portion of the hopper has the shape of a vertical Venturi-tube surrounded by a Venturi nozzle. A first air supply is connected with said nozzle around the Venturi-shaped 80 end of the hopper; a second air supply abuts in a tube continuing the said nozzle. This apparatus is also provided with a third pipe for balancing the pressure abutting laterally into the bunker. The disadvantage of such 85 a device resides in the necessity of having Venturi-tubes, of dividing the hopper in a series of different elements and of using three different tubes for air supply.

In another known apparatus for the lifting 90 of coke breeze, wet sand and the like use is made of a main receptacle the upper part of which is connected to a separate hopper through a non-return valve. An air pipe abuts laterally into said hopper which is 95 open. The said receptacle contains in its middle portion a tube held in place by suitable transversal supports and has its lateral

walls provided with pipes introducing compressed air. A pressure pipe is also provided for introducing compressed fluid at the upper part of the receptacle, through the lateral pipes and into a discharge pipe located below said receptacle.

Finally, it has also been proposed to use pulsations of the air pressure to effect the automatic control of the conveyance of pulverised material in a plurality of pressure vessels.

In contradistinction thereto, the present invention relates to a pneumatic conveyor for concrete or like material which is very simple, efficient and does not necessitate any mechanical propulsion means. Furthermore, this apparatus may be used in a continuous manner with a continuous air supply.

The invention comprises a pneumatic conveyor for concrete and like material, comprising a container or hopper which in use is closed at its top and is provided with inlet means secured thereon and through which the concrete or like material is poured directly by the operator into the container, the upper part of said container being connected by a tube with a continuous supply of compressed gas adapted to act in the direction from top to bottom on the entire mass of material contained in said container and to cause a heaping or a packing thereof in the direction of the discharge passage of said container, the lateral walls of said hopper being continuous and solid without any openings, and the inside space being clear of any moving valvular or stationary members so as to allow the unimpeded flow of material to the discharge passage and being entirely available for holding the material, the discharge passage being located at the lower part of the said hopper axially with respect thereto, the container comprising a discharge pipe means directly connected with said discharge passage and disposed substantially perpendicular to the longitudinal axis of said container and passage and connected permanently by a supply pipe to a continuous supply of compressed gas, said supply pipe having a part thereof parallel to the discharge pipe, the compressed gas being adapted to flow through said supply pipe into said discharge pipe and to evacuate or propel the plug of material formed periodically in the said pipe near the discharge passage under the said continuous heaping and packing action due to the pressure prevailing in the upper portion of the container and exerted on the entire mass of said material in the direction from top to bottom.

One form of construction of a pneumatic conveyor according to the invention is illustrated, merely by way of example, in the accompanying drawing.

According to this constructional example,

the conveyor comprises a hopper 1, designed to receive the concrete or the like at an inlet 2. A valve of any kind, actuated by a lever 3 for instance, enables the hopper to be opened for filling purposes and then closed again.

An inlet connection 4 for compressed gas leads to the interior of the hopper. This inlet is so designed as to create a predetermined pressure in the interior of the hopper 1.

The hopper terminates in a discharge passage 5, bent or straight, for distributing the concrete or the like. The shape of this rump has been designed with a view to permitting the best flow of the concrete, on the one hand from the hopper to the passage and on the other hand from the passage to the conveying conduit. This discharge passage is permanently connected by piping 6 to a source of compressed gas, not shown. This source may be the same as the source that feeds the hopper 1. The diameter of the piping 6 is calculated so as to create a sufficient pressure in the passage 5, but without it being greater than the pressure prevailing in the hopper.

The operation of the apparatus described is very simple. The valve or flap that normally closes the top of the hopper is opened by acting upon the lever 3. The hopper is then filled with concrete, after which the valve is closed. The cock 7 for admitting compressed gas into the conduits 4 and 6 is opened. The concrete, under the action of the pressure exerted on the upper part of the hopper, descends and accumulates in front of the discharge passage to form a plug. At this moment, the pressure created in this conduit manifests itself and drives forward the plug of concrete, being replaced, however, by another plug practically at once.

The apparatus may be stationary or portable. In the drawing, the apparatus has been shown fixed on to supports 8.

It will be clearly seen that the principle of the apparatus consists in causing a piling of the concrete towards the discharge conduit, followed by an unstopping or evacuation of this conduit.

The invention is not restricted in any way to the form of construction shown and described which has been given merely by way of example except that it is limited by the claims.

Having now particularly described and ascertained the nature of our said invention and in what manner the same is to be performed, we declare that what we claim is:—

1. A pneumatic conveyor for concrete and like material, comprising a container or hopper which in use is closed at its top and is provided with inlet means secured thereon and through which the concrete or like material is poured directly by the operator

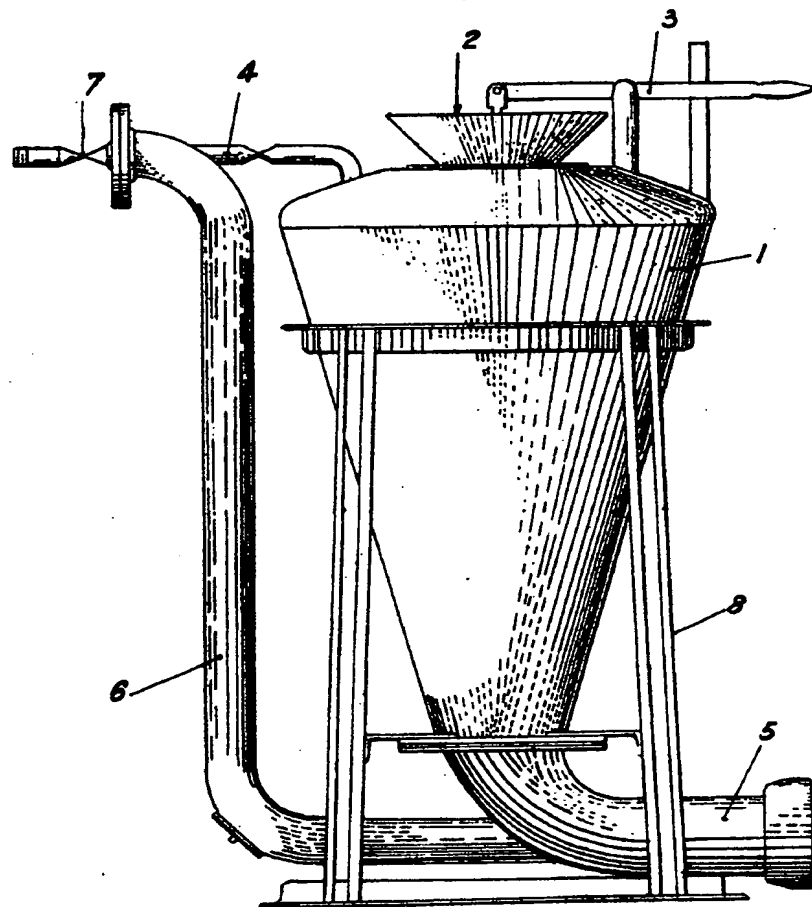
into the container, the upper part of said container being connected by a tube with a continuous supply of compressed gas adapted to act in the direction from top to bottom on the entire mass of material contained in said container and to cause a heaping or a packing thereof in the direction of the discharge passage of said container, the lateral walls of said hopper being continuous and solid without any openings, and the inside space being clear of any moving, valvular or stationary members as so to allow the unimpeded flow of material to the discharge passage and being entirely available for holding the material, the discharge passage being located at the lower part of the said hopper axially with respect thereto, the container comprising a discharge pipe means directly connected with said discharge passage and disposed substantially perpendicular to the longitudinal axis of said container and

passage and connected permanently by a supply pipe to a continuous supply of compressed gas, said supply pipe having a part thereof parallel to the discharge pipe, the compressed gas being adapted to flow through said supply pipe into said discharge pipe and to evacuate or propel the plug of material formed periodically in the said pipe near the discharge passage under the said continuous heaping and packing action due to the pressure prevailing in the upper portion of the container and exerted on the entire mass of said material in the direction from top to bottom.

2. A pneumatic conveyor for concrete and like material substantially as described and represented in the annexed drawing.

Dated this 17th day of December, 1948.

MARKS & CLERK.



This Drawing is a reproduction of the Original on a reduced scale